

Computer Use in Preschools: Directors' Reports of the State of the Practice

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Abstract

For a number of years, authorities in the field of early education have questioned whether computers should be used in classrooms of young children. In response to the controversy surrounding computers and young children, this study investigated directors' reports of the use of computers in Texas child care facilities. Directors of licensed child care programs responded to a survey of 12 questions about computer use in their centers. Results from the majority of respondents indicated that preschool children begin using computers in child care centers between ages 2 and 4 years, regardless of socioeconomic status. Directors responded that the most important goal in children's use of computers was to extend concepts learned in the classroom. The preferred method of instruction in computer use was individual instruction; the most common form of supervision was an adult monitoring a specific classroom zone. The most common placement of computers was in a special learning center in the classroom.

Introduction

Philosophically, computer use with young children has created debate among early childhood educators and other professionals for decades. Since the time computers were introduced into America's school settings 25 years ago, questions such as, "Doesn't computer use with young children create passive learners?" "Shouldn't children have concrete objects for learning?" or "Don't children have difficulty manipulating computers?" have plagued experts. Controversies over the question of the role of technology in young children's learning have polarized the field, and the role of technology is still debated.

A number of early researchers found that computer use by young children had positive learning benefits. Cochran-Smith, Kahn, and Paris (1988) posit that children's writing abilities are enhanced with technology. Their only concern is that some children use the keyboard ineffectively and have misconceptions about how print should appear on the page. Hess and McGarvey (1987) note achievement in mathematics, problem solving, and scientific skills among children. Research completed by Weir, Russell, and Valente (1982) suggests that computers facilitate the education of children with disabilities.

Other early educators doubt the value of technology's usefulness with young children. Wardle (1999) believes that computers do not need to be part of children's foundation for learning. She asserts that the early years are necessary for establishing a foundation for success later in life, and computers have limited value in doing so. Cordes and Miller (2000) report that an international group of physicians, scientists, and researchers called for a moratorium on computers in preschools and early elementary grades. They believe that computers interfere with healthy physical and mental development. Hohmann (1998) recommends that computers not be used with children younger than 3.

Others tout the benefits of computer use with young children. Clements (1999) maintains that "Technology can change the way children think, what they learn, and how they interact with peers and adults" (p. 1). He also recommends technology as a tool for improving children's learning through exploration, creative problem solving, and self-guided instruction (Clements & Samara, 2003). Haugland (2000a, 2000b) supports teacher implementation of technology in classrooms with children 3 and 4 years old if they are allowed plenty of time to experiment and explore.

The overarching issue appears to be whether computer use with young children is developmentally appropriate. The National Association for the Education of Young Children (NAEYC) has defined developmentally appropriate computer use with young children. In their position statement "Technology and Young Children-Ages 3 through 8," NAEYC (1996) notes that professional judgment is required by teachers to determine whether technology is age appropriate, individually appropriate, and culturally appropriate for the children in their care. NAEYC recommends the integration of technology into the learning environment as *one* of many options to support children's social and

cognitive abilities but cautions that computers should not replace other valuable learning centers, such as blocks, art, sand or water play, books, dramatic play, or exploratory areas in the classroom.

NAEYC calls for all children to have equal access to technology but recommends that teachers ensure that technology experiences are monitored to avoid exposing children to stereotyping of groups and violence. NAEYC suggests that teachers work with parents to advocate for more appropriate technology applications for children. NAEYC also recognizes and supports the value that technology adds to early childhood professional development.

Mark Ginsberg (2001), executive director of NAEYC, presents guidelines to teachers and parents for protecting young children from hazards associated with computer use and access to the Internet: Children need supervision and advice about computer use; rules should be developed for computer use; and adults should be present when the computer is used, to promote interactive discussion about what children are viewing. Ginsberg's perspective is that the computer is a tool that must be used just like any other classroom material or equipment, with judgment and moderation.

A number of studies have examined how technology affects children with special needs. Malone and Langone (1999) provide evidence that computers promote a virtual play environment for children with special needs. Software is now available that provides computer experiences compatible with the characteristics of play (nonliterality, positive affect, flexibility, means over ends locus, and spontaneity). Mioduser, Tur-Kapsa, and Leitner (2000) recognize the potential for instructing children with learning disabilities in early reading skills (phonemic awareness, word and letter recognition). Bush, Huchital, and Simonian (2002) report that research initiatives at the STARBRIGHT Foundation support computer technology with young children with special health care needs. Their technology is designed to help children with chronic health conditions (such as cystic fibrosis) cope with and manage their treatment regimens.

A three-year project at the Center for Best Practices in Early Childhood Education at Western Illinois University (Hutinger & Johanson, 2000) provides additional support for using computer technology with young children with disabilities. Their study emphasizes access to computers as an avenue to social interaction among children, working cooperatively, gaining confidence in themselves, controlling their environments, and making gains in language and communication. Hutinger and Johanson, supported by research by Clements (1999), point out that the enabling component of computers assists children in transforming concrete ideas into symbolic form.

Fischer and Gillespie (2003) describe their research in a Head Start classroom. Their findings suggest that (1) open-ended software programs encourage children to explore and extend beyond their thinking, (2) computers are just another option in the classroom, (3) computers help bridge concrete and abstract thinking, and (4) technology stimulates cooperative behaviors among children. They also report that the teacher encourages children to help others who may be struggling with computer use.

Given the disparate views regarding the wisdom of using computers with young children philosophically, this study investigates directors' reports of actual practice in using computers in child care. The purpose of this study was to determine how widely computers are used in licensed child care centers in Texas. A survey was mailed to directors of licensed child care facilities in Texas with a return envelope to encourage response from directors. Questions asked about the ages that children begin using computers, the ratio of computers per child, the type of computer instruction provided to children, supervision of children, access to computers by children with disabilities, availability of assistive devices, Internet access, classroom placement of computers, the goals of computer use in centers, and whether children had access to computers at home.

Method

Participants

Data from the Texas Department of Human Services was provided through a file of 8,003 licensed child care facilities in the state. Surveys were mailed to a sample of 800 child care directors.

Participants were selected randomly within a stratified sample, with every tenth facility within a zip code area selected for participation. Eight hundred surveys were mailed to child care directors, with 257 surveys returned. Forty-six (5.8%) of the surveys were received with "Return to Sender" indicated, and 211 (26.4%) were completed and returned. Zip codes of surveys that were returned were a representative sample of regions in Texas. The distribution of income in returned surveys was similar to that of the state; however, fewer participants had annual incomes over \$100,000. This difference likely reflects the low use of child care centers by families with annual incomes over \$100,000.

Based on the demographic data from zip codes of participants returning surveys, 63.3% were classified as "In Urbanized Area," 23.5% were classified as "In Urban Cluster," and 13.1% were classified as "Rural" (U.S. Census Bureau, 2000). These data can be compared with the population data of Texas. In Texas, 71.0% of the population were classified as "In Urbanized Area," 11.6% were classified as "Outside Urbanized Area," and 17.51% were classified as "Rural" (U.S. Census Bureau, 2000). In the survey sample, participants classified as "In Urbanized Area" were somewhat underrepresented, and those classified as "In Urban Cluster" were overrepresented in comparison to the state of Texas. All classifications are based on population density according to the U.S. Census Bureau.

Instrumentation

Questions on the survey were based on a review of the literature and interviews with local child care directors. The literature on the use of computers with preschoolers addresses the age of beginning computer use, placement of computers in centers, and learning from peers (Haugland, 2000b). Questions regarding computer use by preschoolers with disabilities were included because of the legal requirements for equal access in the Americans with Disabilities Act (1990) and the requirement to provide assistive technology in public schools in the Individuals with Disabilities Education Act (Assistance to States, 1999). Other questions were included based on the investigators' observations of practices in local preschool programs. Questions were developed to probe the following areas: (1) demographic variables, (2) age at which children begin to learn computer use, (3) the extent to which computers are available, (4) instructional arrangements for computers, (5) placement of computers in the classroom, (6) use by children with disabilities, (7) the goals of computer use, and (8) preferred software.

A pilot questionnaire was developed and mailed to a sample of 10 local directors, who made suggestions for improvement. Initially, all questions required one answer; several directors recommended that the survey provide for multiple answers for some items. When examining the goals of computer use, directors recommended adding the following options: "to teach basic skills needed in school and life" and "to extend concepts taught in the classroom." A question regarding the ratio of staff to children was omitted based on the feedback from several directors that this question was unclear; state requirements stipulate different ratios of supervision for different age groups. Additionally, the term "software" was suggested rather than "computer programs." Finally, several directors recommended that the survey be restricted to one page, front and back, because directors are very busy with the management of their centers. The survey instrument is shown in the appendix.

Procedures

Following revisions of the pilot survey, the survey was mailed to the random sample of 800 directors of licensed child care centers in the state. The database of licensed child care facilities was sorted by zip code, and every tenth center was selected for the survey. Results of returned surveys were entered into the database for the Statistical Package for the Social Sciences (SPSS).

Pearson product-moment correlations were used to determine the relationship between family income and the age of beginning computer use of children in child care centers, the ratio of computers to children, and the percentage of children using computers at home. In this case, the predictor variable was mean family income, and the criterion variables were age of beginning computer use,

ratio of computers, and percent using computers at home. Alpha was established a priori at .05. All data were analyzed using SPSS.

Finally, descriptive statistics were used to describe the goals of using computers, methods of teaching computer use, methods of supervision, placement of computers, use of computers by children with disabilities, and the use of computers at home. Additionally, programs preferred by boys, programs preferred by girls, and programs preferred by both boys and girls were tallied for descriptive data on preferred software.

Results

When examining mean family income as a predictor of computer use, only one significant correlation was found. Mean family income was a predictor of computer use in the home ($r = .562, p < .001$), but it was not a predictor of the age at which children began using computers in the center ($r = .085, p = .113$) or the ratio of computers per child in the center ($r = .068, p = .196$).

Results of analysis of variance yielded no significant differences between income levels in the child care center in relationship to directors' goals for children using computers. Mean family income of children within the center did not appear to be related to directors' ratings of the importance of various goals in using computers within the center. Directors rated the goal of extending concepts taught in the classroom highest when comparing means of the six goals rated in this study. The second most important goal was allowing children to explore and play with technology. Next in importance was teaching basic skills needed in school and life. The means of each of these top three goals were rated as "important." The mean of the goal to provide appropriate use of free time was rated as "important." Finally the means of increasing enrollment for the center and rewarding good behavior were rated as "somewhat important." Of these, the goal rated lowest was to reward children for good behavior.

The preferred methods of teaching children to use computers were through individual instruction, followed by learning by observing other children. The third most frequent method of instruction was peer instruction, followed by group instruction. The least-used methods for teaching children to use computers were learning by observing adults and through tutorial software.

Directors reported two methods of supervision of computer use most frequently: adults visually monitoring the zone where computers are used and independent use of computers in centers. The third ranking method of supervision was with adults beside the children as they used computers. The vast majority of child care centers (88%) in this study reported that Internet access was not available to children at the center. The few that did provide opportunities for Internet access for the children did so with an adult monitoring a group of children. Four directors reported that children used the Internet with a filter, and three directors reported Internet use with one-to-one supervision. Finally, no one reported that children were allowed to use the Internet without supervision or a filter.

Computers were most often placed in learning centers within the classroom and occasionally in a room separate from the classroom. Most of the directors (62.8%) reported that there were no children with disabilities at their centers; when children with disabilities attended a child care center, they most often used computers in the same way as other children. Only four directors reported that computers had been adapted for children with disabilities. No directors reported that children with disabilities did not use computers. The most frequent age for beginning computer use in child care centers was between the age of 2-3 years (39.5%), followed by 3-4 years (17.6%), less than 2 years (16.6%), and 4-5 years (4.9%). Also worthy of note in this study is the fact that 21.5% of the child care centers do not provide for computer use at all.

Although most child care centers in this study provide computers for young children, these computers generally were shared with a large number of children. Most centers (47%) reported that there was one computer for more than 30 children; 38.75% reported having one computer for every 20 to 30 children. Only 7.5% reported having one computer for every 5 to 10 children, and 6.25% had one computer for every 10 to 20 children. The remaining directors (.5%) were unsure of the ratio in their centers.

Directors completing the survey responded to a question regarding the percentage of the children in their centers who used computers at home. Results were fairly evenly distributed. Fifty-nine directors reported that 25-49% of their children used computers at home; 52 reported that 50-74% of their children had access to computers in the home. Fifty directors reported that 75-100% of their children were able to use computers at home; 41 directors estimated that 0-24% of their children had this access. Three directors did not answer this question.

Few directors reported differences regarding genders when asked to list software preferred by boys and software preferred by girls. Four directors listed Tonka Construction as "preferred by boys"; five listed art/drawing programs as "preferred by girls." The top programs listed as "preferred by both genders" were Jumpstart programs (17) and Reader Rabbit (18). Most directors did not answer this question, leaving it blank, perhaps because of the administrative nature of their role, rather than direct supervision of the content of the programs used by children.

Discussion

Implications

Regardless of the controversy of whether computers are appropriate for preschool classrooms, computers are being used in the majority of child care centers that were surveyed. Although some authorities in the field of early education believe that computer use interferes with development, the child care directors that responded to this survey did not adopt this position.

Recommendations about computer use with preschoolers clearly state that children should be monitored while they are on the computer (NAEYC, 1996). The survey of Texas child care center directors suggests that monitoring is a common practice in their classrooms, with adults visually monitoring where computers are used. Only a few of the child care directors reported that Internet access was available to children in their centers, and those centers that did have Internet access allowed children access only when an adult was present.

Mean family income was a predictor of computer use in children's homes, but it was not related to the age at which children use computers in child care centers. This result suggests that personnel in child care facilities are taking the leadership role in enabling children to access technology that otherwise might not be available in the home. For children from low-income families, the access to computers in preschool classrooms provides them with skill acquisition unavailable in their homes. The directors' goals in providing classroom technology were not related to family income of children in their centers.

The primary goals listed by directors were more aligned with developmentally appropriate practice as recommended by NAEYC. The most important goals were (1) extending concepts, (2) promoting exploration and play, and (3) teaching basic skills needed in school and life. Rated of lesser importance were: (1) using computers for free time, (2) increasing center enrollment, and (3) rewarding good behavior. The directors generally favored developmentally appropriate use of computers for children's cognitive development. Classroom computers were *not* viewed as public relations tools or electronic babysitters. The fact that software showed few gender differences is likely because software for preschoolers is not designed to be gender specific. Also, most directors left this item blank, so the sample was small.

Limitations

Although this study indicated that computers are widely used in child care centers, a number of issues need to be considered. Although Texas is a large state with a diverse population, computers may not be as widely used in other states with different demographic, economic, or cultural variables. The sample in this investigation was representative of the economic strata in Texas and the sample was randomly drawn, but the sample size was small in comparison to the more than 8,000 licensed child care centers in the state. Although socioeconomic status and parental educational level are highly correlated (Krieger, Williams, & Moss, 1997; Sewell & Hauser, 1975),

the study did not probe the mean educational attainment of the parents of children in child care centers. Other variables that were not addressed in the survey were the NAEYC accreditation status of centers, receipt of federal funds, the curriculum used in centers, the percentage of children in centers from underserved populations, and whether or not centers were affiliated with a franchise. Additionally, there is a possibility that the directors of centers where computers were not used did not return the survey. Finally, the survey is based on directors' perceptions and reports, which may differ from actual classroom practice.

Recommendations

A national survey of child care centers would be helpful for understanding the degree to which computers are used in the United States, as well as other issues surrounding how they are used in preschool classrooms. Some of the variables that could be included in future surveys include parental educational attainment, center accreditation status, receipt of federal funds, the curriculum used in centers, the percentage of children in centers from underserved populations, and whether centers were affiliated with a franchise.

Interviews with child care directors and staff can increase the body of knowledge of how computers are used by preschool children. Qualitative research with parents and teachers of young children is needed to assist in understanding their goals and beliefs about computer use with preschoolers. Actual observations of children in child care centers would reveal how computers are actually used, as opposed to their use as reported by directors. Finally, longitudinal research is needed to investigate the effects of early computer use on children's social and cognitive development.

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Appendix

Survey of Computer Use in Texas Child Care Centers

Please complete the following questions regarding computer use in your center:

1. At what age do children begin to use computers in your center?
 - a. under 2 years
 - b. 2-3 years
 - c. 3-4 years
 - d. 4-5 years
 - e. not available-please skip to question 11
2. What is the ratio of computers per child in your center?
 - a. 1 computer for every 5-10 children or fewer
 - b. 1 computer for every 10-20 children
 - c. 1 computer for every 20-30 children
 - d. 1 computer for over 30 children
 - e. not available
3. How are children taught to use the computer at your center? (please circle all that apply)
 - a. Observing other children
 - b. Observing adults
 - c. Tutorial software
 - d. Group instruction
 - e. Individual instruction
 - f. Peer instruction
4. What is the **most common** form of supervision of children using computers?
 - a. adults visually monitor zone where computers are used
 - b. adults are beside children as they use computers
 - c. children use computers independently in centers or the classroom
5. How are computers placed in your center?
 - a. in learning centers in the classroom
 - b. in a separate room from the classroom
 - c. other (specify): _____
6. How do children use the Internet at your center?
 - a. with 1-1 adult supervision
 - b. with adult watching a group of children
 - c. independently with an Internet filter
 - d. independently
 - e. Internet access not available to children
7. How are computers used in your center with children who have disabilities?

- a. used in the same way as other children used computers
- b. computers have been adapted for children with disabilities
- c. computers are not used with children in our center who have disabilities
- d. no children with disabilities are enrolled at our center

8. What peripheral devices are used with children with disabilities? (please check all that apply)

<input type="checkbox"/> trackball	<input type="checkbox"/> mouse	<input type="checkbox"/> touch screen
<input type="checkbox"/> adapted switch	<input type="checkbox"/> special keyboard	<input type="checkbox"/> none used
Other : (specify) _____		

9. Please rank the goals of using computers at your center by checking the appropriate box:

Goal	Not Important	Somewhat Important	Important	Very Important
To provide appropriate use of free time				
To increase enrollment for the center and public relations				
To allow children to explore and play with technology				
To reward children for good behavior				
To teach basic skills needed in school and life				
To extend concepts taught in the classroom				

10. Please list the most popular software/computer programs used at your center:

Preferred by boys	Preferred by girls	Preferred equally by both genders

11. Estimated percentage of children at your center who use computers at home:

☐ 0-24% ☐ 25-49% ☐ 50-74% ☐ 75-100%

12. Estimated average annual income of families of children at your center:

<input type="checkbox"/> <\$15,000	<input type="checkbox"/> \$15-24,999	<input type="checkbox"/> \$25-49,999
<input type="checkbox"/> \$50-74,999	<input type="checkbox"/> \$75,000-99,999	<input type="checkbox"/> \$100,000 or more

Please return survey in stamped envelope today.

Thank you!